pulling, and a connected inner ring pulling or pushing. I do not myself see that the existence of acceleration—in the strictly mathematical sense—in a ring rotating with uniform angular velocity is any real disadvantage; but if Mr. Wilberforce thinks it is, then as an accomplished and not too materialistic mathematician, he will, I hope, be satisfied with the case of a ring formed of matter repelling as, say, the inverse square of the distance.

Judging by what has passed, I think an attempt to put clearly the problem as it exists in a magnetised ring may be of service. Suppose the diagram on the preceding page to represent 3 out of, let us say, 360—or any larger number deemed requisite to justify treating arc and chord as practically identical—equal elements of a ring. When unmagnetised suppose each to be of length l, and to be separated from its neighbours by extremely small air gaps of width λ. The elements may be supposed to lie on a smooth horizontal table. When uniformly and equally magnetised each element will change in length, let us suppose lengthen, by the same amount δl. This lengthening is due presumably to several causes; of which one is the tension which experiments by Dr. Taylor Jones and others have shown to be nearly $B^2/8\pi$, so long as the permeability is large. For shortness, I shall treat this tension as actually $B^2/8\pi$ up to actual contact. The contribution to δl due to this stress may be taken as $B^2 l/8\pi E$, where E is an elastic modulus, which, strictly speaking, varies with B. Suppose now B so chosen that $\delta l = \lambda$, so that the width of the air gaps reduces to zero. Then Mr. Wilberforce's view would seem to be that at the instant the gaps close the stress producing the lengthening $B^2 l/8\pi E$ becomes zero, and comes into existence again only when the consequent shortening of the elements reopens the gaps; in this way a species of oscillation would ensue. Prof. Ewing, I rather fancy, would suppose the stress to exist until there is absolute continuity of matter. To deal with either view, suppose that at the first instant of contact, by some process of welding which leaves the material unaltered, the 360 elements transform into a solid ring. Call the state just before welding M, and that when equilibrium has ensued after welding N; then the following views seem to be or have been held:

(1) (By Mr. Shelford Bidwell, Dr. More, and Prof. Ewing [originally]) that the ring in N is shorter than my reasoning makes it in M by $2 \times (360\ B^2 l/8\pi E)$.

(2) (By Prof. Ewing [now] and Mr. Wilberforce) that the ring in N is shorter than in M by $1 \times (360\ B^2 l/8\pi E)$.

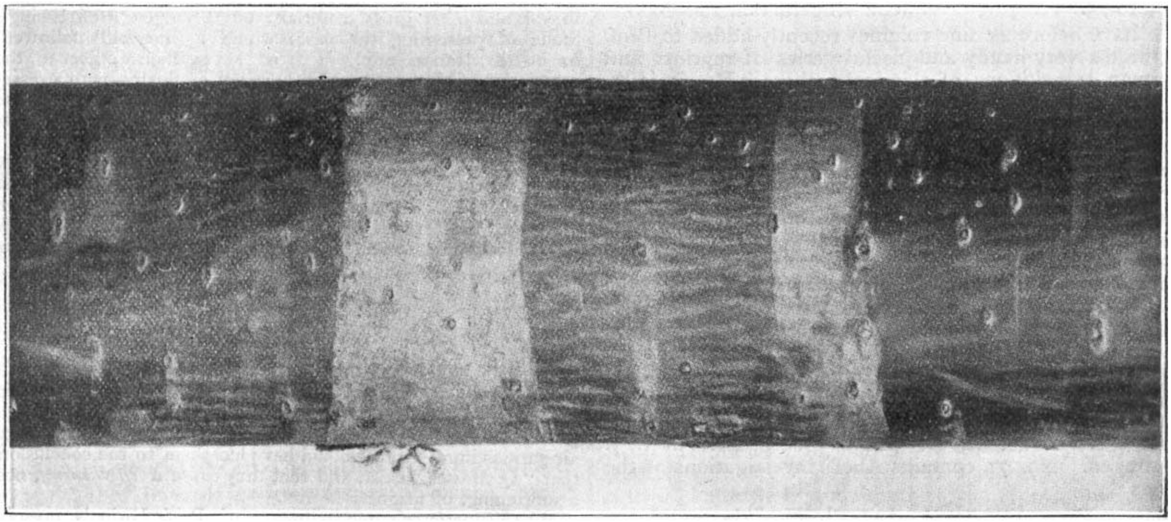
(3) (By, I believe, Prof. J. J. Thomson, Dr. Taylor Jones, and myself) that the ring in N, if shorter than in M, is so by a less amount than $1 \times (360\ B^2 l/8\pi E)$. CHARLES CHREE.

March 23.

The Sacred Tree of Kum-Bum.

REFERRING to the letter of Mr. W. T. Thiselton-Dyer, you have published under the title "The Sacred Tree of Kum-Bum" (March 5, 1896, p. 412), I may add that Dr. Kanitz (as I am told by Dr. S. Bretschneider) identifies the tree as the *Ligustrina amurentis*. With the permission of the Vice-President of the Imperial Russian Geographical Society, I send you herewith a photograph (natural size, untouched) of about two-thirds of the piece of the stem of that tree in possession of the I.R.G.S., which received the piece from a lama who visited Kum-Bum late in the autumn of 1894.

The wood is very light, the bark thin (the diameter of the piece being 46 × 47 on one end, 45 × 46 millimetre on the other; the thickness of the back does not exceed 1 millimetre, being the third of it in some places of the circumference), its surface is somewhat rugged, as from desiccation (to be seen on the photo), the outer tissue is grey, translucent, the colour of the bark reddish, the signs *in* it of a golden hue, and can be discerned through the epiderm, but are best seen when the latter is pulled off.



Natural size in breadth, about two-thirds in length, of the piece in possession of the Imperial Russian Geographical Society, St. Petersburg.

A. GRIGORIEV,
Secretary of the Imperial Russian Geographical Society,
St. Petersburg.

A Jamaica Drift Fruit.

IN connection with the article by Dr. Morris on a Jamaica drift fruit, which appeared in NATURE of November 21, 1895, I am able to supplement it by a record of the tree in Trinidad. On March 10, after a personal visit to the vicinity, I despatched Mr. Lunt, my assistant—who may be remembered as being attached to Mr. Bent's expedition to the Hadramaut—to search for the tree or trees stated to have been seen by Messrs. Crueger and Devenish. I am glad to say that I have now Mr. Lunt's report on the trip before me, and still better, I have specimens taken from the trees, which show that *Saccoglottis amazonica* may still be regarded as one of our forest trees. Mr. Lunt followed as directed the course of one of the rivers, and found the tree in more than one place. He was able to bring fresh fruits, leaves and buds, but no flowers were to be had. Mr. Lunt notes that the specimens brought show that the fleshy outer layer or sarcocarp is not, as has been supposed, worn away by water, but owing to its palatable character forms the food of numerous fruit-eating animals, and that on falling to the ground it is further cleaned by ants.

It appears that after the sarcocarp is eaten away the seeds rest upon the ground until the occurrence of heavy floods, when they are washed away by the currents.

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The sarcocarp is very pleasant to the taste, and is to be compared very closely with the exterior of many species of the genus Pyrus—as far as I could judge from the single specimen brought home in the green state.

Abundant fresh seeds deprived of the sarcocarp were procured, and a dissection of these shows how accurate are the drawings of Crueger, which were produced in Dr. Morris's article. We hope to secure full sets of herbarium specimens later.

J. H. Hart.

Royal Botanic Gardens, Trinidad, B.W.I.

The Rotation-Period of Venus.

During the years 1876 and 1878 I paid some attention to Venus at the Kempshot Observatory, and although no distinct markings on the disc were seen in the very small equatorial, yet the following observation may prove valuable:—"1876 October 2, 6 a.m. The planet dichotomised, but the terminator is not straight; the S. horn projects, and the N. horn is rounded off."

By comparing the sketch then made with the drawing, Fig. 1, in the article in Nature of February 20 (p. 367), there can be no doubt that the broader features in the curvature of the terminator are the same in both. Fig. 1 was taken from a drawing by Signor Mascari, October 12, 1892, or about sixteen years after mine.

Now every eight years the earth and Venus come to nearly their same position again in their respective orbits, for 365·24d. × 8 = 2921·9d., and 224·7d. × 13 = 2921·1d.; and consequently if the rotation-period of Venus be 224·7d., any well-marked permanent feature will become visible every eight years.

The question is whether this curvature of the terminator will prove to be a permanent feature or not under the circumstances detailed above; and for the answer we shall have to wait until the western elongation of Venus in September or October 1900, when observations made at or a little after the time of dichotomisation will show whether the agreement of the drawings in October 1876 and 1892 was a mere coincidence or not.

Jamaica, March 14. Maxwell Hall.

A Remarkable Meteor.

Mr. Backhouse's observation of the beginning of flight of the slow-moving meteor of March 1 appears to have been from a point 2° south-east of α Canis Minoris instead of between α and β of that constellation, as I at first assumed from the description. This misunderstanding shows the extreme importance of noting meteor tracks according to the best method, viz. that of giving the R.A. and Decl. of the beginning and end points. This is at once simple and effective; it avoids the frequent errors which occur when projecting meteor tracks from descriptions (sometimes ambiguous) of their courses by the stars, and saves endless trouble.

A reinvestigation of the path of the meteor shows it to have commenced its visible career when nearly over York at a height of 55 miles, and it was last seen by the observer at Sunderland when 53 miles high. Mr. Clark at York, however, watched it much further, and after it had passed over Heligoland when its height had again increased to 55 miles. The radiant was nearly on the western horizon, and the meteor, which in the early part of its flight was descending towards the earth, showed a slight ascent towards the end. The average velocity from the two estimates of duration seems to have been about 20 miles per second.

An observation from Kiel or Hamburg would be very useful for comparison, as the meteor at its terminal stages was comparatively near those places, and must have been far more brilliant than it appeared from York and Sunderland.

Bristol, April 3. W. F. Denning.

Simple Huyghens' Apparatus for the Optical Lantern.

In his excellent handbook on experimental optics, "Light," Mr. Lewis Wright describes and figures the well-known double-image phenomena to be observed when an ink-dot is viewed through two superposed rhombs of calc-spar. He does not suggest, and I have not seen elsewhere the suggestion, that the experiment is readily adapted to lantern projection. This, however, is the case, and when so projected this experiment is more useful to the demonstrator than that of the double-image prisms, commonly known as Huyghens' experiment, since the apparatus is more simple. There is no colour correction to explain—nothing to occupy the mind of the student but the action of the spar.

My method is to take two small rhombs of a thickness of 1½ inches or more, and mount them near together in such a way that one or both can be rotated. I use by preference a small parallel beam from the parallelising lens, and between this lens and the rhombs, close to the latter, is placed a thin metal plate having an aperture of a size depending on the thickness of the rhombs. The thicker the rhombs the larger, of course, can be the aperture. The rays, after passing through the pieces of spar, are focused by the ordinary objective so as to give sharp images of the aperture in the plate. Rhombs can often be found whose cleavage faces are quite perfect enough to allow sharp images.

It is evident that a single rhomb in the position here indicated may be made to serve nearly or quite all of the purposes of the double-image prism—may sometimes, indeed, to the advantage of the demonstration, replace the analysing Nicol. This fact has its obvious usefulness in the present scarcity of Iceland spar.

F. W. McNair.

Michigan Mining School, Houghton, Michigan, U.S.A.

THE MANAGEMENT AND PROTECTION OF FORESTS.[1]

II.

The working plan of coppice woods is a simple matter. The area is divided into as many compartments as there are years in the rotation. If the coppice is cut, when it has attained the age of fifteen years, fifteen compartments are formed, and every year the old wood on one compartment is cut, after which the coppice shoots grow up to form the new crop. The rotation is determined by the species composing the coppice, and the class of material required, and the yield depends upon the areas cut over, which are equal, where the quality of the locality is uniform, unequal in inverse proportion to the quality, where the quality varies.

In the case of high forests, matters are more complicate, and a brief indication of the main subjects that must be attended to, may serve to explain what is done. A thorough examination of all portions of the forest, its previous treatment, soil, climate, and other conditions, which influence the growth of trees, an accurate and detailed survey of the growing stock, and, lastly, the market for timber and other produce, and the labour available for forest work, are the points which must be examined in the first instance. The next subject is the study of the lines of communication, roads, and watercourses to be used for the transport of timber; and, lastly, the subdivision of the forest into blocks and compartments. A forest to be manageable must consist of compartments of moderate and fairly uniform size. On level ground regular rectangular figures are most convenient; in a hilly country, compartment boundaries must follow the configuration of the ground. Obviously it is in every respect convenient that, wherever practicable, compartment boundaries should coincide with export roads; the sooner, therefore, a system of roads is projected and traced on the ground the better, the traces serving as compartment lines, though the roads need not be built until cuttings are made in the compartments adjoining them.

Simultaneously with the division of the forest into blocks and compartments, the method of treatment must be considered, the choice of species, and the sylvicultural system, particularly with regard to the regeneration of the forest, and the arrangement of cuttings. Large forest areas will generally have to be divided into several working sections, each with its own system of treatment—say one working section for coppice woods,

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[1] "A Manual of Forestry," by William Schlich, C.I.E., Ph.D. Vol. iii. (pp. xix + 397). "Forest Management," by William Schlich. Vol. iv. (pp. xix + 593). "Forest Protection," by W. R. Fisher, B.A. (London: Bradbury, Agnew, and Co., 1895.) (Continued from p. 515.)

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